

## CLAIMS

- 1) A piezoelectric transducer comprising:
  - a) a chamber diaphragm having first and second opposing surfaces, a given chamber diaphragm thickness, and a given chamber diaphragm width,
  - b) a mesa having first and second opposing surfaces, a given mesa thickness, and a given mesa width wherein the first surface of the mesa is adjacent to the first surface of the chamber diaphragm, and
  - c) a piezoelectric material element having a given piezoelectric material element width adjacent to the second surface of the mesa.
- 2) The piezoelectric transducer of claim 1 wherein the mesa further comprises an insulative layer at least partially on the second surface of the mesa.
- 3) The piezoelectric transducer of claim 1 further comprising an electrical contact layer at least partially interposed between the piezoelectric material element and the second surface of the mesa.
- 4) The piezoelectric transducer of claim 1 wherein the mesa comprises a substantially insulative material.
- 5) The piezoelectric transducer of claim 1 wherein the mesa comprises a substantially conductive material.
- 6) The piezoelectric transducer of claim 1 wherein the chamber diaphragm comprises a substantially conductive material.
- 7) The piezoelectric transducer of claim 1 wherein the chamber diaphragm comprises a substantially non-conductive material.
- 8) The piezoelectric transducer of claim 1 wherein the mesa thickness is at least approximately 10% of the chamber diaphragm thickness.

- 9) The piezoelectric transducer of claim 1 wherein the mesa width is less than the chamber diaphragm width.
- 10) The piezoelectric transducer of claim 1 wherein the piezoelectric material element width is greater than the mesa width.
- 11) The piezoelectric transducer of claim 10 wherein the piezoelectric material element width is greater than the chamber diaphragm width.
- 12) The piezoelectric transducer of claim 1 further comprising a second piezoelectric material element having a second piezoelectric material element width adjacent to the second surface of the chamber diaphragm.
- 13) The piezoelectric transducer of claim 12 further comprising a second mesa having first and second opposing surfaces, a given second mesa thickness, and a given second mesa width interposed between the second piezoelectric material element and the second surface of the chamber diaphragm.
- 14) The piezoelectric transducer of claim 13 wherein the second mesa further comprises an insulative layer at least partially on the second surface of the mesa.
- 15) The piezoelectric transducer of claim 13 further comprising an electrical contact layer at least partially interposed between the second piezoelectric material element and the second mesa.
- 16) The piezoelectric transducer of claim 13 wherein the second mesa comprises a substantially insulative material.
- 17) The piezoelectric transducer of claim 13 wherein the second mesa comprises a substantially conductive material.
- 18) The piezoelectric transducer of claim 13 wherein the second chamber diaphragm comprises a substantially conductive material.

- 19) The piezoelectric transducer of claim 13 wherein the second chamber diaphragm comprises a substantially non-conductive material.
- 20) A piezoelectric transducer comprising:
- a) a chamber diaphragm having first and second opposing surfaces, a given chamber diaphragm thickness, and a given chamber diaphragm width,
  - b) a mesa having first and second opposing surfaces, a given mesa thickness, and a given mesa width wherein the first surface of the mesa is adjacent to the first surface of the chamber diaphragm,
  - c) a piezoelectric material element having a given piezoelectric material element width adjacent to the second surface of the mesa, and
  - d) an electrical interconnect layer interposed between the chamber diaphragm and the mesa.
- 21) A piezoelectric transducer comprising:
- a) a chamber diaphragm having first and second opposing surfaces, a given chamber diaphragm thickness, and a given chamber diaphragm width,
  - b) mesa having first and second opposing surface, a given mesa thickness, and a given mesa width wherein the first surface of the mesa is adjacent to the first surface of the chamber diaphragm, and
  - c) first and second piezoelectric material elements, each element having a given piezoelectric material element width wherein the first piezoelectric element is adjacent to the second surface of the mesa and the second piezoelectric element is adjacent to second surface of the chamber diaphragm.